User Manual

Tobii® Technology

Tobii T60 & T120 Eye Tracker

Revision 4

tobii
www.tobii.com

On Safety

Read this manual carefully before connecting and using the eye tracker

The Tobii T60 and T120 Eye Trackers are intended only for use in office and home environments.

Do not open the eye tracker!

Non-compliance will result in loss of Warranty! There are no user serviceable components inside and the risk of electric shock is high due to the presence of Dangerous High Voltages. Contact Tobii support if your eye tracker is not working properly.

Safety of NIR illumination from the Tobii T Series Eye Trackers

The illuminators of the Tobii T Series Eye Trackers have been tested at ETL SEMKO, Stockholm, according to IEC/EN 60825-1/A1-A2. The test has shown that the products comply with the standard for IEC/EN 60825-1/A1-A2 class 1 LED products intended to be used for long time exposure.

The standard IEC/EN 60825-1/A1-A2 states an Accessible Emission Limit (AEL) for continuous long time exposure. This limit is the maximum illumination that a person should be exposed to for eight hours a day many days in a row.

The products are intended to be used by a subject at a distance of approximately 60 cm from the eye tracker. At the regular user distance the exposure, averaged over time, of light from the Tobii T60 and T120 Eye Trackers to the subject sitting in front of it is 0.1 % of the allowed limit for long time exposure according to IEC/EN 60825-1/A1-A2 class 1 LED products.

Epilepsy warning

Some people with Photosensitive Epilepsy are susceptible to epileptic seizures or loss of consciousness when exposed to certain flashing lights or light patterns in everyday life. This may happen even if the person has no medical history of epilepsy or has never had any epileptic seizures.
Such people may have a seizure while watching certain images or patterns on a monitor, or even when exposed to the light sources of an eye tracker. It is estimated that about 3-5% of people with epilepsy have this type of photosensitive epilepsy.

Declaration of Conformity

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules and EMC directive 2004/108/EG. The product also conforms with the directive 73/23/EEC for low voltage and environmental directives 2002/95/EC and 2002/96/ EC.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

* Reorient or relocate the receiving antenna.
* Increase the separation between the equipment and receiver.
* Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
* Consult the dealer or an experienced radio/TV technician for help.

CE

All Tobii Eye Trackers are CE-marked, indicating conformity with the essential health and safety requirements set out in European Directives.

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Tobii T60 & T120 Eye Tracker User Manual

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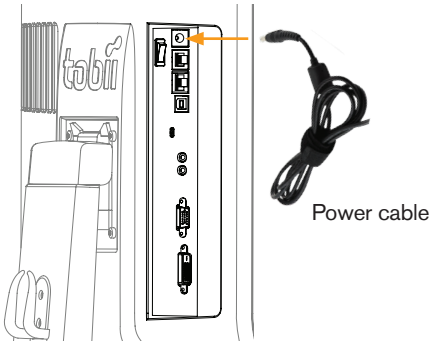
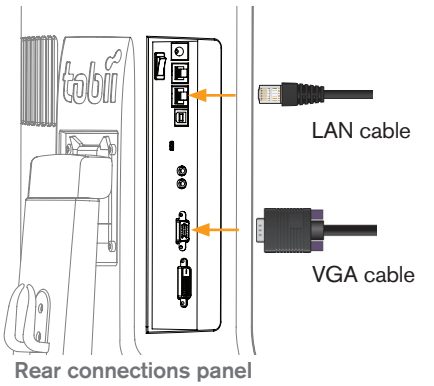
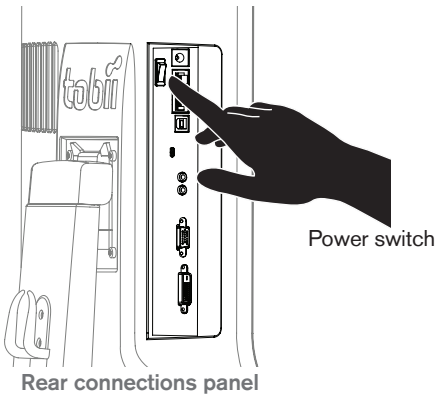
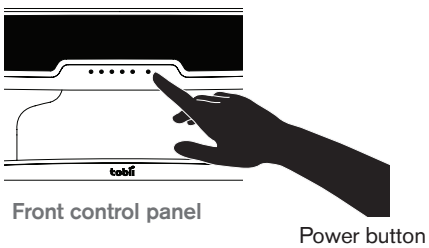
Quick Start

Step 3. First time usage









First time usage

1. **Assemble the Tobii T60/T120**

   Assemble the monitor to the desk stand. Make sure all parts are mounted correctly and secured. Read more on page 7.

2. **Configure the network card**

   Install and configure the separate USB Ethernet adapter, configure the built in network card in your computer, your network router, or your office LAN. For complete details see pages 8-10.

3. **Install the eye tracker software**

   Install Tobii Studio or Tobii Eye Tracking Tools. For complete details see page 8.

4. **Connect the eye tracker to your computer**

   Connect the Power, LAN and VGA cables and turn on the eye tracker by pressing the Power switch. Press the Power button on the front panel to choose the input mode (Digital). See figures on the left. For details on connecting the User Camera and Built-in Speakers read page 8.

5. **Reboot your computer**

6. **Connect the eye tracker to Tobii Studio**

   Start Tobii Studio or other supported software and make sure the eye tracker is connected. For complete details see pages 9-11.

7. **Adjust your physical setup**

   Adjust the physical setup of the eye tracker and other devices. For details see page 13.

8. **Create your Project and Tests in Tobii Studio**

   For details read chapter 4 of the Tobii Studio User Manual.

9. **Calibrate and record in Tobii Studio**

   For details read chapter 4 of the Tobii Studio User Manual.

Component checklist

- **Tobii T60 or T120 Eye Tracker**
- **Computer with Tobii Studio or other supported software**
  (Download the Tobii System Recommendations document from www.tobii.com)
- **Tobii Studio or Tobii T/X Series Eye Trackers Resources CD**
- **Power supply cable**
- **VGA or DVI-D cable**

- **LAN cable**
- **USB - LAN Adapter**
- **Audio Cable**
- **User Camera USB Cable A/B**

Product Care

Temperature and humidity

Do not place the eye tracker in places subject to extreme temperatures and humidity, such as on top and or near a heating element, or in a damp room.

Do not expose the eye tracker to direct sunlight. Failure to comply may lead to equipment damage due to high temperature exposure.

The recommended range of temperatures and humidity values are:

Storage temperature: 0°C to +35°C / 32°F to 95°F
Storage humidity: Max. 70%, no condensation
Usage temperature: +20°C to +35°C / 50°F to 95°F
Usage humidity: Max. 80%, no condensation

Placement

Only use arms and stands specified by the supplier and make sure that they are mounted and fastened correctly according to the instructions. Do not place the eye tracker on unstable and uneven surfaces.

Avoid places subject to strong mechanical vibrations or shock. The eye tracker should not be operated on moving vehicles.

Do not cover the ventilation openings of the eye tracker. If these openings are covered built up heat may cause failure and a possible fire hazard.

Ingress protection

IP class 20. No protection against objects smaller than 3.5mm.

Do not place the monitor in places with large amounts of dust, dirt or sand, for example, near an open window or an outdoor exit.

If setting up temporarily in an outdoor location take adequate precautions against airborne dust and dirt.

Do not use the eye tracker near water. The eye tracker is not water resistant.

Mechanical shock

If the eye tracker is exposed to mechanical shock, for example, when dropped, do not try to connect it to a power source. Contact Tobii support.

The same applies to the power supply.

Power

It is recommended that you connect the power cable of the eye tracker and computer to an outlet with a protective earthing connection.

Use an accessible outlet and make sure that the cables are properly placed to avoid a possible trip hazard.

Only use the power supply sent with the eye tracker. The warranty is not valid if a different power supply is used.

Transportation

Disconnect all the cables and grasp the monitor with both hands when carrying it.

When you transport the eye tracker for repair, shipment or traveling, use the original casing and packing materials.

Cleaning

Before cleaning the eye tracker's monitor unplug the power cord from the power outlet. Only use products intended for screen cleaning. Avoid dripping liquids into the openings between the screen surface and the chassis as the eye tracker may be seriously damaged.

Eye tracker setup

For full functionality and best performance use computers that fulfill the Minimum System Requirements and third party equipment from the System Recommendations Tobii Studio document (available for download at www.tobii.com).

Make sure the network connection is set up according to the description in this manual. For a more robust connection use a peer-to-peer type of connection (Option A, page 8).

Disposal of the eye tracker

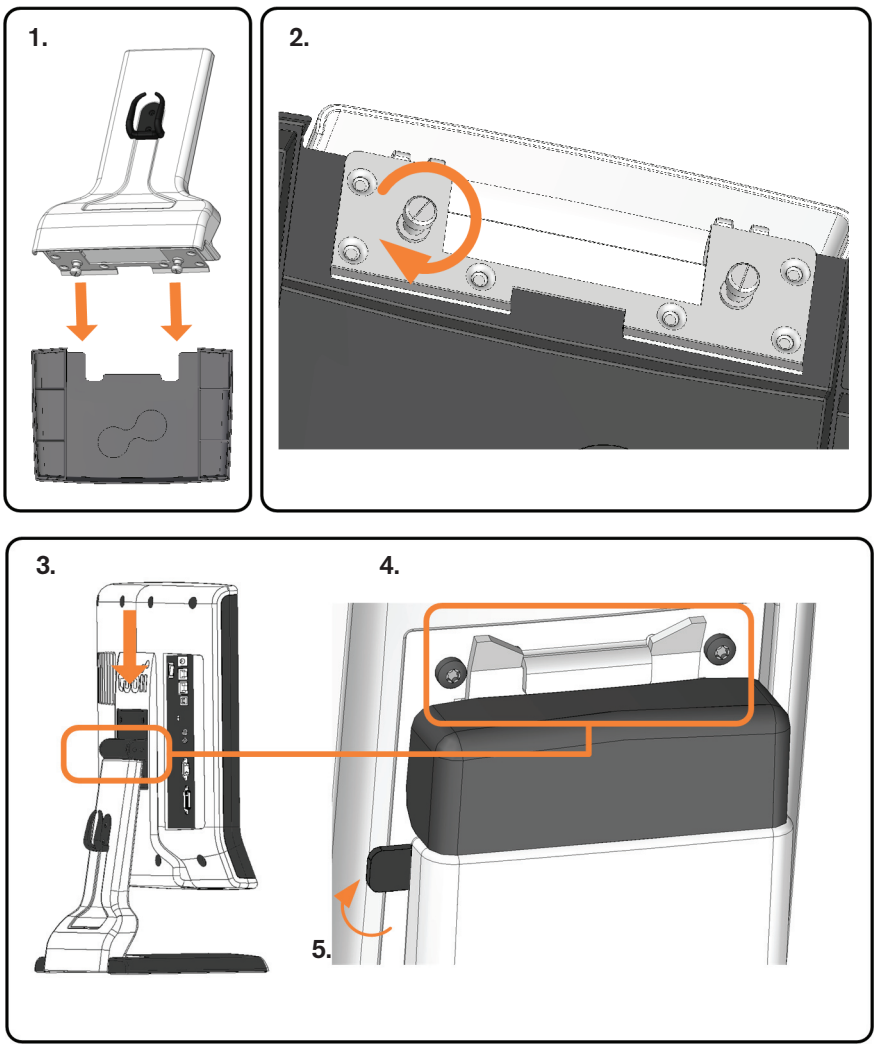
Do not dispose of the eye tracker in general household or office waste. Follow your local regulations for disposal of electrical and electronic equipment.

Assembling the Tobii T60/T120

Assembling the desk stand

The eye tracker is shipped together with a standard Tobii desk stand. The mounting procedure is as follows:

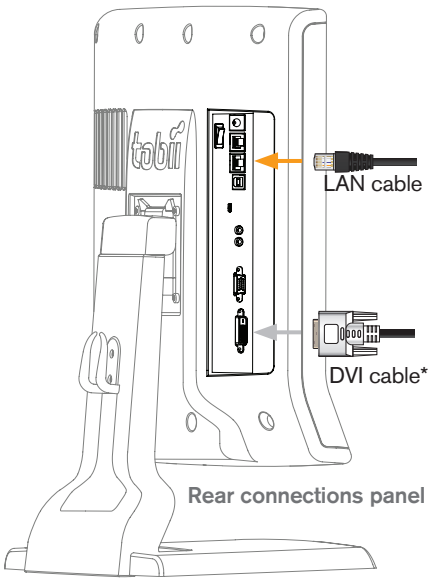
1. Slide the foot on to the stand.
2. Tighten the screws with a screwdriver
3. Connect the monitor bracket on to the stand bracket.
4. Check if the monitor-stand connection is in the right position.
5. Pull the lock lever on the monitor bracket to secure the connection.



To disassemble the eye tracker monitor from the desk stand, angle the monitor horizontally, unlock the monitor bracket, and lift the monitor straight up.

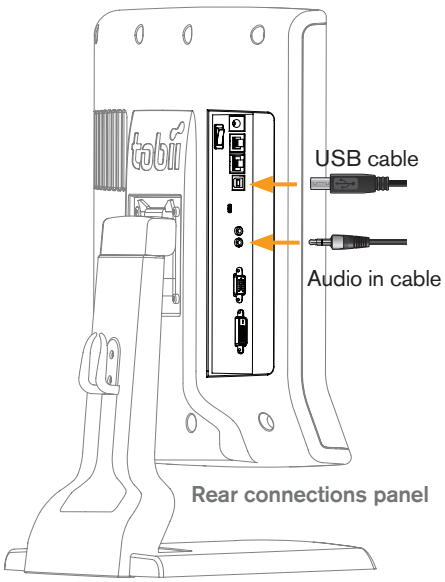
Connecting the eye tracker

Option A & B. Eye tracker connectors



* To connect a VGA cable see the second figure in page 4.

Connect the USB User Camera and the speakers (Audio in) to the computer if you wish to use the built-in user camera and audio speakers.

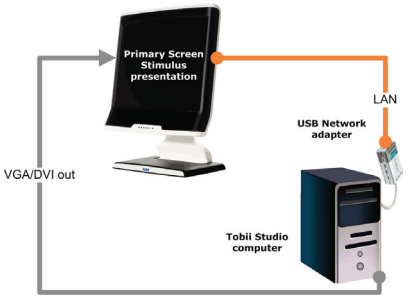


Setting up the connection to your computer

The eye tracker communicates with the computer via a standard network cable. Connect the eye tracker to your computer using the LAN cable (**LAN**). There are two different ways you can setup the communication between the eye tracker and your computer:

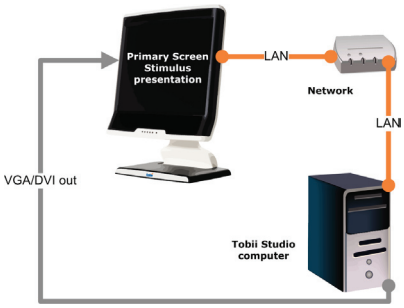
Option A

Connect the eye tracker directly to your computer by using the USB Ethernet adapter included (see installation instructions below) or by connecting the eye tracker to the built in network card in your computer. The network card must be configured in Windows to obtain an IP address automatically (see instructions on next page). Windows will say limited connectivity for the eye tracker LAN connection. This is correct, ignore the warning. Please note that if you connect the eye tracker directly to the built in network card in your computer you wont be able to access Internet unless you use an additional network card or a wireless network.



Option B

Connect the eye tracker directly to your office LAN or to a separate network Router. The office LAN or the Router must be configured to automatically give the eye tracker an IP address via DHCP. After properly being recognized by the office LAN or the Router the eye tracker can be accessed by any other computer on the same network running Tobii Studio, ClearView or Tobii SDK.



Installing the USB Ethernet Adapter

If you want to use setup **option A** explained above start by installing the USB Ethernet adapter on your computer. Plug the USB cable into an available USB port on your computer. Windows will detect new hardware and prompt you for the Drivers, which can be found on the Tobii T/X Series Eye Trackers Resources CD provided. Please follow the on screen instructions. For detailed instructions on driver installation, please refer to the network adapter manual on the CD.

Installing the USB User Camera Driver

Plug the USB cable into an available USB port on your computer. Windows will detect new hardware and prompt you for the Drivers, which can be found on the Tobii T/X Series Eye Trackers Resources CD provided with the eye tracker.

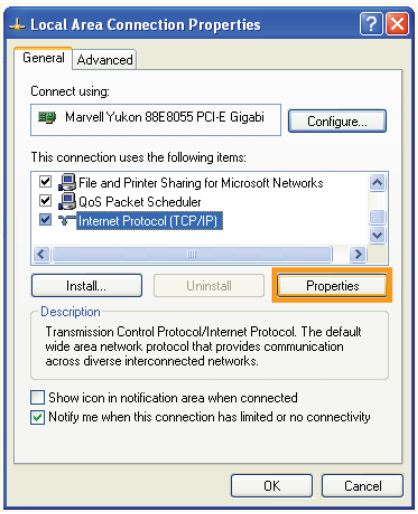
Installing eye tracker software

Install Tobii Studio, ClearView, Tobii SDK or other supported eye tracking software on the computer you intend to use. To install Tobii Studio just insert the Tobii Studio CD and follow the on screen instructions. Please refer to the Tobii Studio Manual for more information.

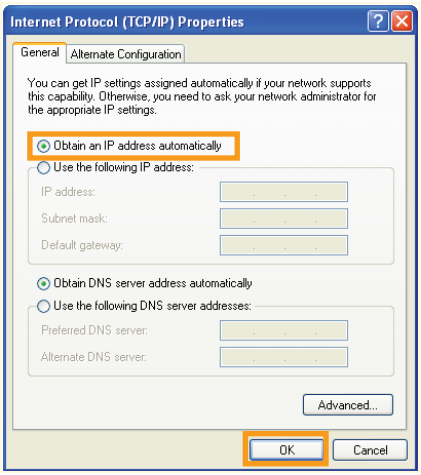
Using the eye tracker without Tobii Studio

If you will not be using Tobii Studio on your computer you must install the Tobii Eye Tracking Tools to be able to access and configure the eye tracker. The installation file called tobii-eye-tracking-tools-X.msi (where X is replaced with the version number of the software) can be found on the Tobii T/X Series Eye Trackers Resources CD provided. After installing the Tobii Eye Tracking Tools you can browse for the eye tracker by going to Start > All Programs > Tobii > EyeTracker Browser. If you install Tobii Studio on your computer the EyeTracker Browser is installed automatically.

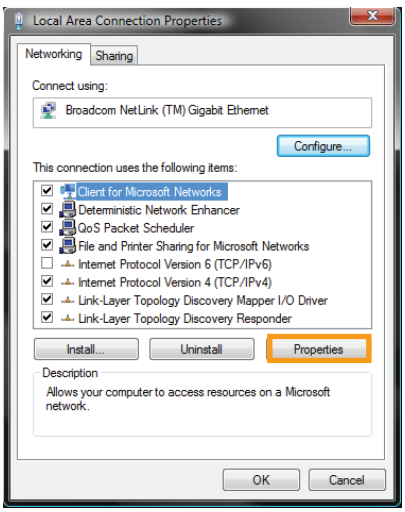
Windows XP Step 4.



Windows XP Step 5 & 6.


Internet Protocol (TCP/IP) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Windows Vista Step 6.



Setting up the network connection to the eye tracker in Windows

The network card in Windows must be configured to **obtain an IP address automatically**. On most computers this is the default setting. Please follow the instructions below to configure the network card.

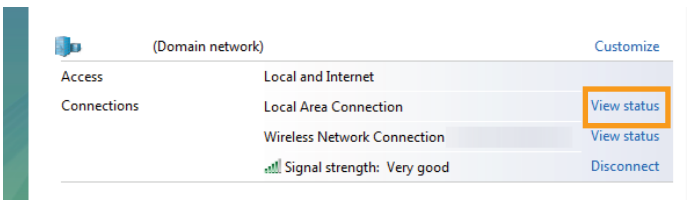
In Windows XP

1. Open the **Windows Control Panel**
2. Open **Network Connections**
3. Right click on the network card you will be using to communicate with the eye tracker. Choose **Properties.**
4. Select **Internet Protocol (TCP/IP)** then click on the **Properties** button. See 1st figure on the left.
5. Make sure that **Obtain an IP address automatically** is selected in the Internet Protocol (TCP/IP) Properties window. See 2nd figure on the left.
6. Click **OK** to close the windows and apply the settings.
7. Turn on and plug in the eye tracker to the network card and reboot your computer.

   Windows will say limited connectivity for the eye tracker network connection. This is correct, ignore the warning.

In Windows Vista

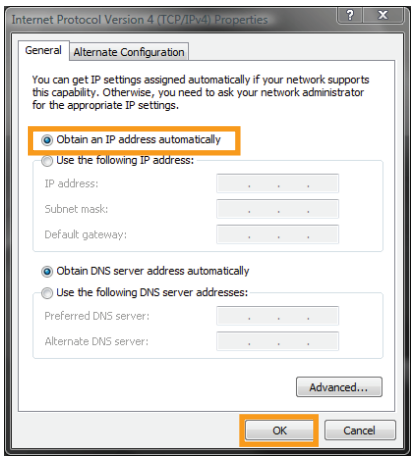
1. Open the **Windows Control Panel** (**Control Panel Home** view)
2. Click on **Network and Internet**
3. Open **Network and Sharing Center**
4. Click on the **View Status** link next to **Local Area Connection** (see figure below). The **Local Area Connection Status** dialog box will open.



5. Click on the **Properties** button. The **Local Area Connection Properties** dialog box opens.
6. Under "This connection uses the following items", click **Internet Protocol Version 4 (TCP/IPv4)**, and then click on the **Properties** button. See 3rd figure on the left.
7. Make sure that **Obtain an IP address automatically** is selected in the Properties window. See 1st figure on the next page.
8. Click **OK** to close the windows and apply the settings.
9. Turn on and plug in the eye tracker to the network card and reboot your computer.

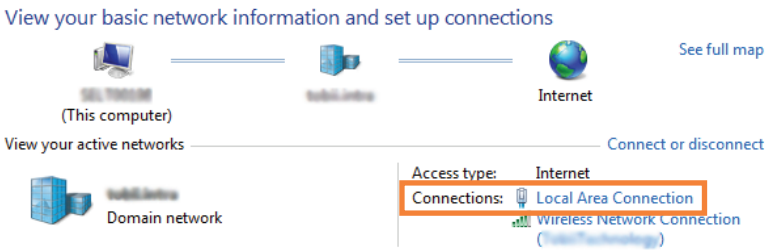
   Windows will say limited connectivity for the eye tracker network connection. This is correct, ignore the warning.

Windows Vista Step 7 & 8.

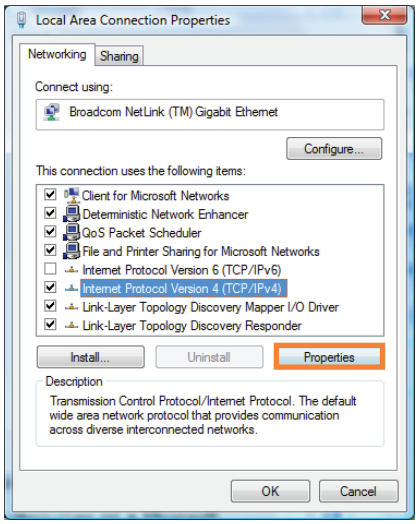

Internet Protocol Version 4 (TCP/IPv4) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

In Windows 7:

1. Open the Windows **Control Panel**
2. Open **Network and Sharing Center**
3. Click on the **Local Area Connection** link next to Connections: (see image below). The Local Area Connection Status dialog box will open.



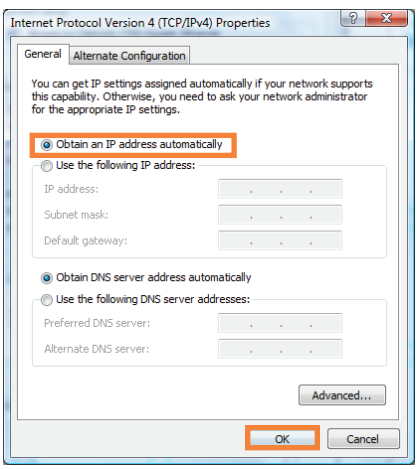
Windows 7 Step 6.



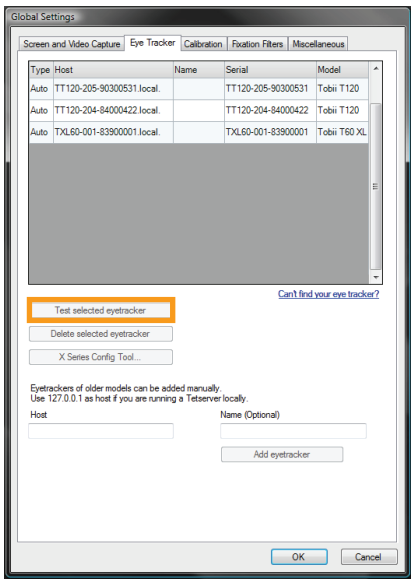
4. Click on the **Properties** button.
5. Click 'Yes' in the dialog window that appears. This action requires an Administrator account on the computer. Consult your system administrator regarding local computer user permissions.
6. Under "This connection uses the following items", click **Internet Protocol Version 4 (TCP/IPv4)**, and then click on the **Properties** button.
7. Make sure that **Obtain an IP address automatically** is selected in the Properties window.
8. Click **OK** to close the windows and apply the settings.
9. Plug in the eye tracker to the network card you just configured and reboot your computer. Ensure the eye tracker is powered on before rebooting the computer.

   Windows will say limited connectivity for the eye tracker network connection. This is correct, ignore the warning.

Windows 7 Step 7 & 8.


Internet Protocol Version 4 (TCP/IPv4) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Connecting in Tobii Studio Step 4.



Connecting to the eye tracker in Tobii Studio

The computer is connected to the Tobii Eye Tracker in Tobii Studio using the instructions below. If connecting to the eye tracker with ClearView or other software see next page. Before using this part of the guide, Tobii Studio has to be installed.

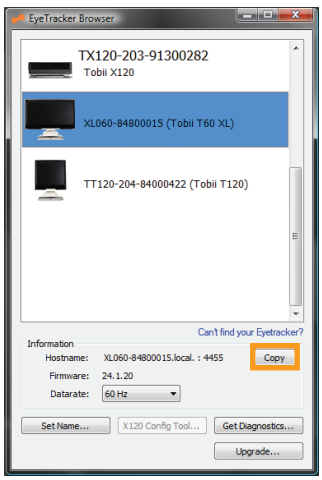
The first time Tobii Studio is opened it is possible to select the a Tobii T Series Eye Tracker and the eye tracker connection window will appear automatically, after that it has to be opened manually by following the instructions below. If this window appears imediately during at the software start go to step 3 below.

1. Go to the **Tools** menu in Tobii Studio and select **Settings**.
2. Click the **Eye Tracker** tab where the Tobii Eye Trackers found are listed. See figure.
3. **Select** the eye tracker to be used. The eye tracker name is similar to the serial number on the back of the eye tracker. When the eye tracker is selected the Tobii Studio software will automatically connect to the eye tracker.
4. The connection can be tested by clicking the **"Test selected eyetracker"** button. Make sure the connection status says **Connected**.

   If there are problems connecting to the eye tracker or if the connection appears slow, try rebooting your computer.

The connection status of the eye tracker can also be monitored in the **Tobii Studio Design & Record** view**.** Below the **Recording** button a status indicator shows if the eye tracker is connected or not. Click on the status indicator to open the **Eyetracker Selector** window**.**

Connecting in ClearView or SDK Step 2.



Connecting to the eye tracker in ClearView or Tobii SDK

The eye tracker is connected by setting the IP address in ClearView, Tobii SDK or other supported software. If Tobii Studio is not installed on your computer you must first install the Tobii Eye Tracking tools to be able to access and configure the eye tracker. The installation file called tobii-eye-tracking-tools-X.msi (where X is replaced with the version number of the software) can be found on the Tobii T/X Series Eye Trackers Resources CD.

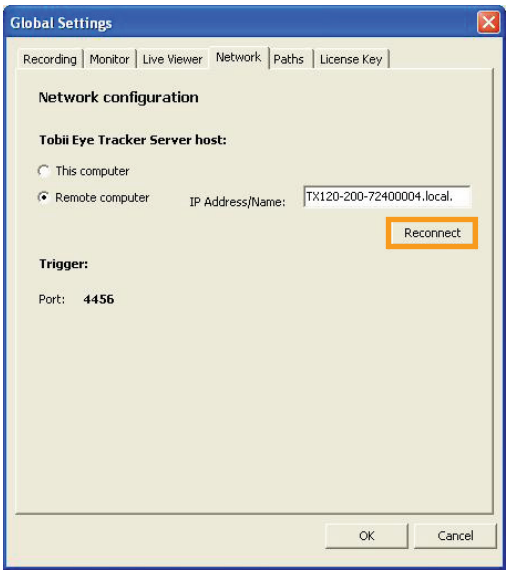
1. To open the Tobii EyeTracker Browser go to the windows **Start** > **All Programs** > **Tobii** > **Tobii EyeTracker Browse**r. The Tobii EyeTracker Browser window is displayed where all eye trackers found are listed.
2. **Select** the eye tracker to be used for testing. The hostname is shown in the information part of the window. This name is similar to the serial number on the bottom of the eye tracker.
3. Click on the **Copy** button to copy the eye tracker hostname, see 3rd figure on the left.

   If ClearView is used see the section "Setting the IP address in ClearView" below. The hostname can be used as IP-address in the SDK and other supported software. It is also possible to set the real IP-address.

Setting the IP address in ClearView

When using ClearView and a T Series Eye Tracker the IP-address has to be set manually in ClearView; see above how to copy the address.

1. In ClearView select **Settings** > **Global Settings** and click the **Network** tab
2. Check **Remote computer** and enter the IP address. Use the Tobii Eye Tracker Browser to get the IP address.
3. Click **Reconnect**.



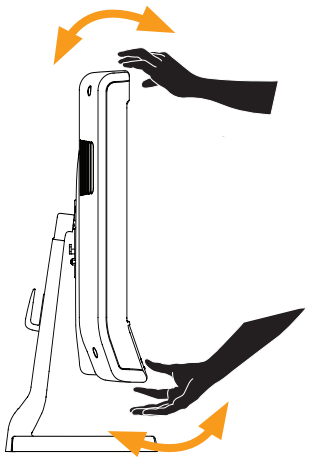
Configuration and Settings

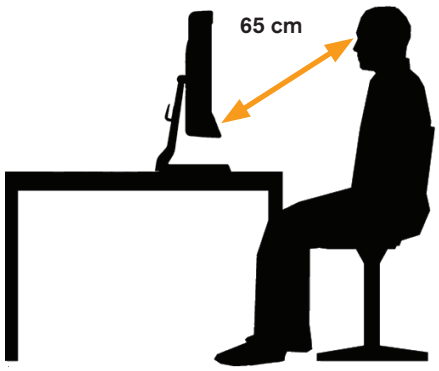
General setup guidelines

The distance from the person's eyes to the eye tracker should be approximate **~65 cm (25.6 inches)**. It is very important to have the **correct distance** to the screen otherwise the eye tracker cannot track the entire area. If the eye tracker is too close to the test subject there is a risk of losing some of the gaze data.

The eye tracker should be placed so that the gaze angle will not exceed **~42° to any point on the screen**.

Adjust tilt

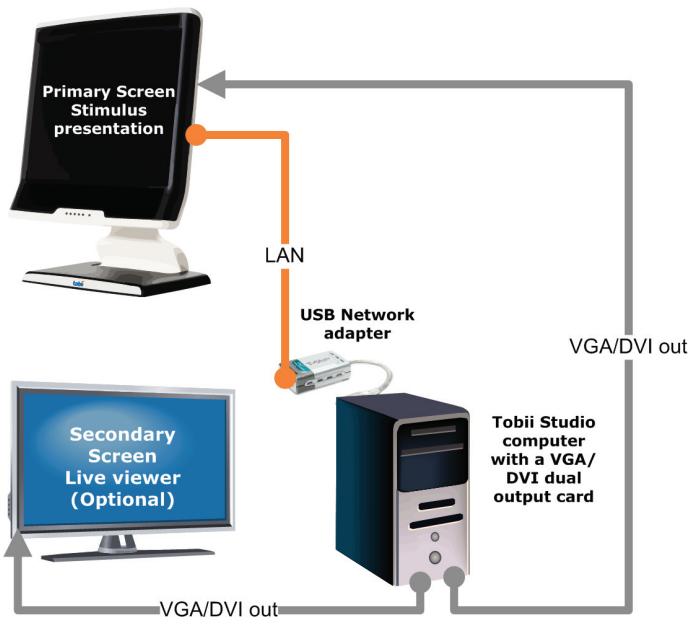




Setup examples

Live Viewer setup

This setup requires Tobii Studio Professional or Enterprise version. When using a Tobii T Series Eye Tracker configure Windows to use the eye tracker's screen as the primary screen. An additional optional secondary monitor can be used for monitoring the eye movements during the recording by using the Live Viewer function in Tobii Studio. For this option the graphics card in the computer must support dual output.

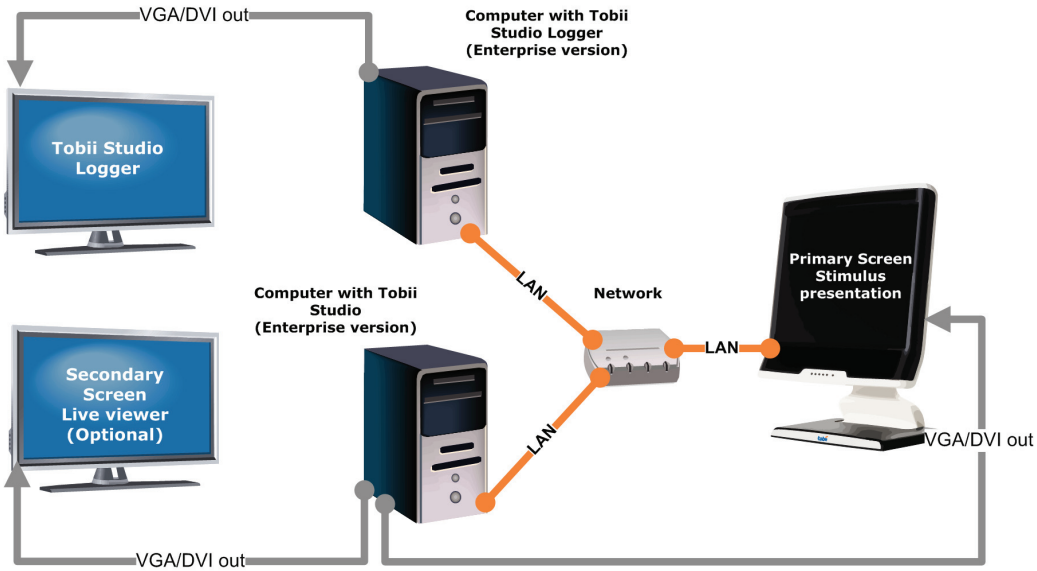


Remote Live Viewer

This setup requires Tobii Studio Enterprise version. This setup is used when the test should be supervised and/or controlled from one or more remote stations. It can be a computer in the next room where a supervisor is sitting and a computer connected to a wide screen for remote viewing for customers etc. In a lot of studies it is important to see the participant's reactions and record the conversation between test leader and test participant, as well as using think-aloud. In this case it is possible to use the built-in user camera and connect a microphone to record the participant's image and sound..

An alternative to using the adapter in the setup drawing is to connect the eye tracker to a local network, see more under the single screen setup option.

To get a portable lab replace the computer in the setup drawing with a laptop or shuttle computer. For Tobii Studio more than one remote viewer can take part of the testing.



External video stimulus recording setup

The Tobii T60/120 Eye Trackers can be set to work with video data originated from a separate computer or other external RGB or VGA source. For example, when the data is streamed from a gaming console or a computer running a different operative system such as Mac OS X, Linux or Solaris. This setup is also recommended when using E-prime on a secondary computer for displaying stimulus.

In order to run this setup both computers need to be connected to the eye tracker's display, either by using the eye tracker's DVI and VGA connections for each of the sources (use the **Source** button in the front of the eye tracker to change the input, figure A next page) or by using a VGA (or DVI) switch to change between the two video feeds (figure B next page).

The computer running Tobii Studio should also have a RGB video capture card to allow Tobii Studio to record the video and synchronize it with the eye tracking data. For details on how to set and run Tobii Studio for analyzing an external video stimulus read section 5.1.2 of the Tobii Studio User Manual

The image from the Tobii Studio computer has to be shown on the eye tracker's display first to run the calibration procedure of the eye tracker, whereas the video data from the other computer should be presented on the eye tracker's display during the actual test.

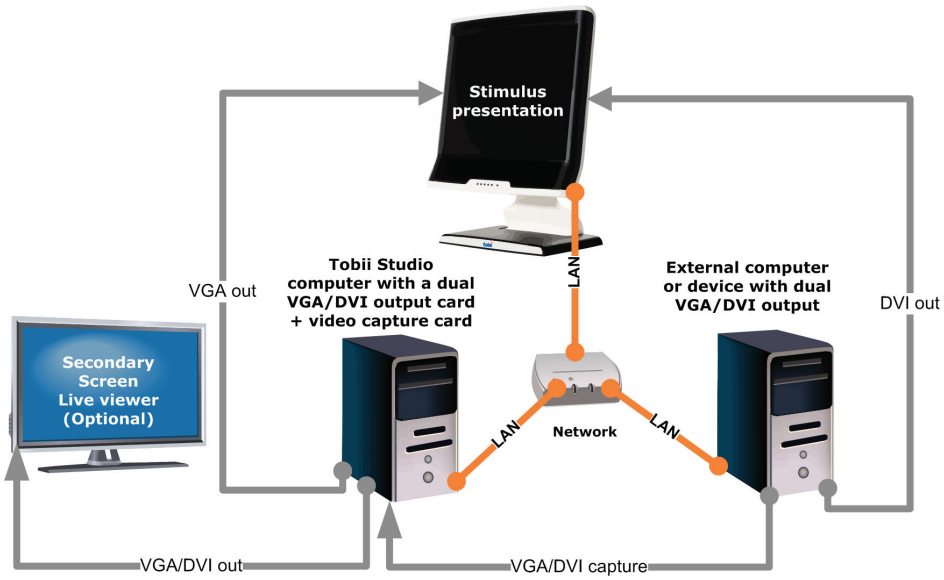


Figure A. Shows the Basic setup used to record an external video stimulus. The video input to the eye tracker's screen is changed by pressing the Source button on the front of the screen.

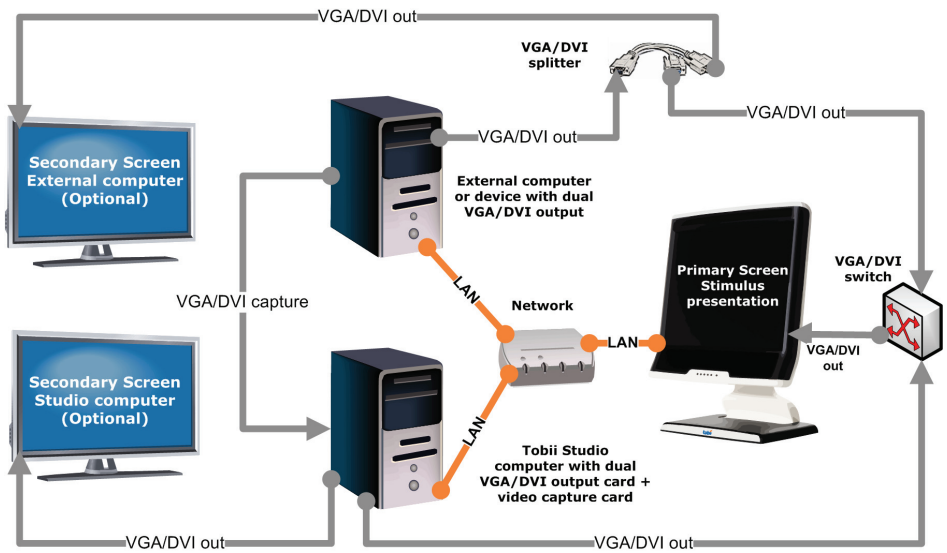


Figure B. External video stimulus recording setup. The video input to the eye tracker's screen is changed using a VGA or DVI switch. Two secondary screens can be connected to the Tobii Studio computer and external computer to allow monitoring of the recording.

Minimum system recommendations

A list with the minimum system recommendations for components that can be used together with Tobii studio is also available, please visist www.tobii.com or contact your Tobii sales representative if you wish to download or receive it.

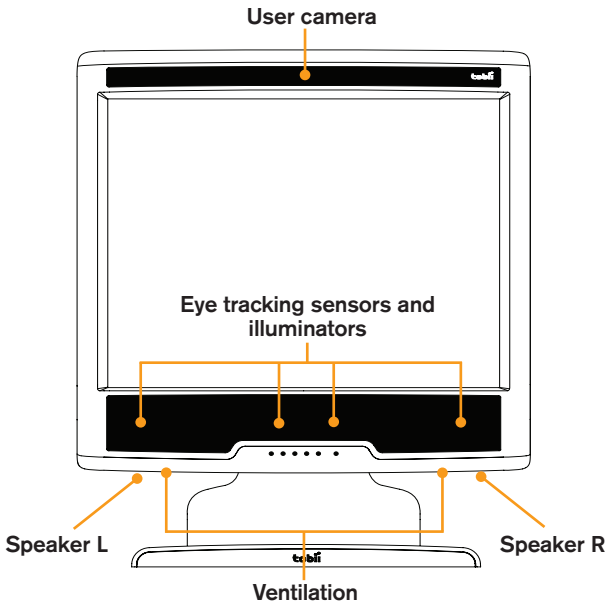
Parts and Controls

Equipment list

- Tobii T60 or T120 Eye Tracker
- Tobii T Series stand
- Tobii T Series foot
- Tobii Studio or Tobii T/X Series Eye Trackers Resources CD
- Tobii T60 and 120 Eye Tracker User Manual
- Power supply cable
- DVI-D cable (2.0 m)
- VGA cable (1.8 m)
- Audio Cable (3.5 mm, 1.8 m)
- LAN Cable (3.0 m)
- USB Cable A/B
- USB - LAN Adapter
- T Series flight case

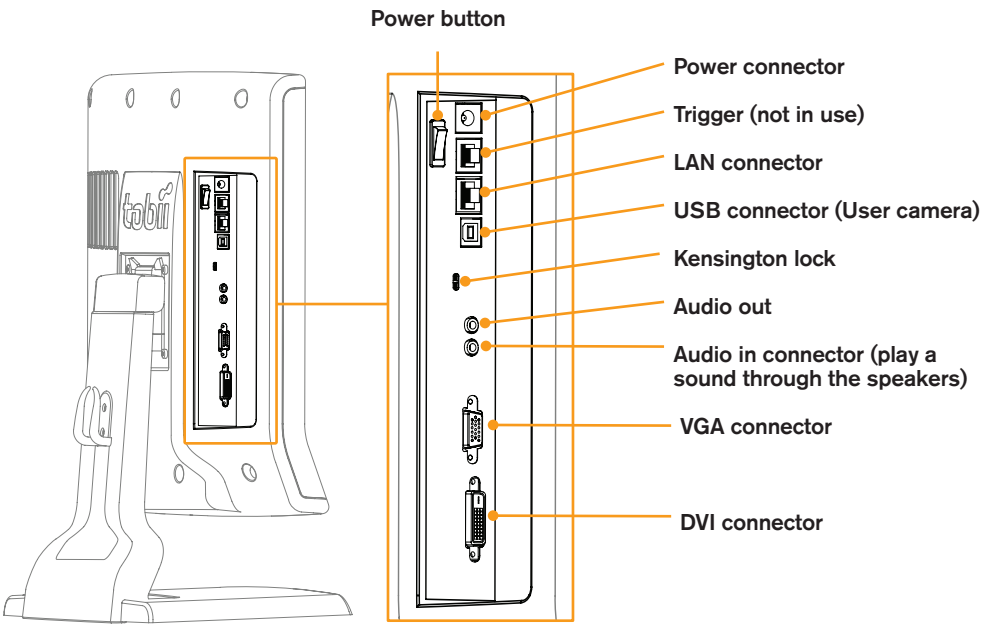
Front display

The Tobii T60 and T120 Eye Trackers have a built in user camera and speakers, located respectively at the front and bottom of the monitor. The power plug and power switch are found behind the eye tracker together with the remaining network and screen connectors. The monitor control buttons are situated at the front of the monitor.



Rear left side panel - Power and connectors

The system power switch and connectors can be found at the rear-left side panel of the eye tracker.



System power switch - press to turn on (**I**) or off (**0**) the Eye Tracker unit. If you only wish to turn off the screen then press the Power button located on the front of the Eye Tracker (see previous page).

Power connector - connect the power cable to the 12V power supply. Only use the power supply delivered together with the Tobii Eye Tracker. The power supply should be connected to a standard power socket (110 or 240 AC).

Trigger - trigger communication port, this function is currently unavailable.

LAN connector - connect the eye tracker to your computer using a LAN cable.

User camera - connect the built-in user camera to the USB port on your computer.

Kensington lock - connect the eye tracker to a Kensington security cable. Secure the eye tracker by wrapping the steel cable around an immovable object, inserting the lock into the Kensington security slot, and turning the key.

Audio connectors - In: connect to the audio output of your computer, plays the sound on the eye tracker's speakers / **Out:** connect to the sound input connector on your computer, loops an external sound source into your computer. Use audio cables with 3.5 mm stereo jack.

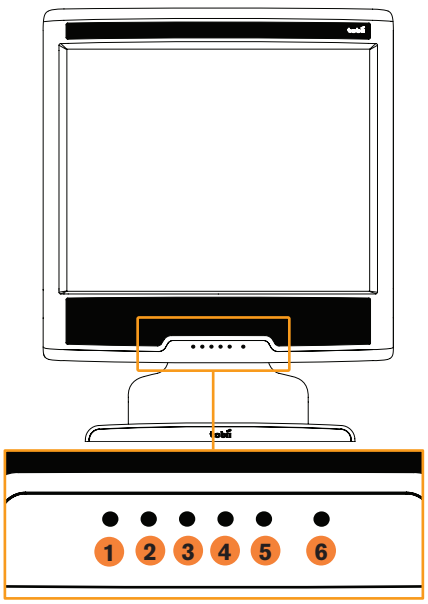
VGA connector - connect to the VGA output on your computer or video equipment.

DVI connector - connect to the digital video output (DVI) on your computer or video equipment.

Note: Most laptops only support VGA while DVI provides a higher quality output. If the study contains images with high detail and stored in an high definition format we recommend to use the DVI connection.

Screen settings buttons

Input image source, screen and sound settings can be accessed on the panel located on the left side of the eye tracker.



Screen settings buttons

1. **Source -** press to select source: Analogue (VGA connector input) or Digital (DVI connector input).
2. **Menu -** press to access the screen settings Menu.
3. **Auto - press to** automatically adjust display settings
4. **Up -** press to move on-screen selection/sound volume increase
5. **Down -** press to move on-screen selection/ sound volume decrease
6. **Power -** press for the monitor to enter in Standby mode.

Customizing the Eye Tracker's Display

On-screen display (OSD) dialog box

The monitor settings can be adjusted on the on-screen display (OSD) dialog box. To display the main OSD menu press the **Menu button** located on the left side of the eye tracker. For best results it is recommended that you turn on the monitor and wait for 30 minutes before making the adjustments.

Navigating the dialog box

Press the Menu button to display the main OSD dialog box on your screen. Use the **Up** and **Down** and **Menu buttons** to navigate between and select the different menus/settings.

Using the Menu, Up and **Down buttons**

1. Press the **Menu button** to display the OSD dialog box**.**
2. Press the **Up** and **Down buttons** to navigate through the different menus and the **Menu button** to select a menu. The first item in the menu gets highlighted indicating that it has been selected.
3. Press the **Up** and **Down buttons** to navigate between the items and the **Menu button** to select the item you wish to change.
4. Press the **Up** and **Down buttons** to make the adjustments, then press the **Menu button** to store the new settings and the display returns to the previous menu.
5. To leave the dialog, press the **Up** and **Down buttons** until EXIT is highlighted, then press the **Menu button** to close the dialog box.

Choosing the image input source

Press the **Menu button** to display the **INPUT SOURCE menu**. Use steps 3 - 4 of Navigating the menu instructions (page 18) to navigate and change the settings.

A RGB (VGA connector)
Change the image input signal source to analog RGB (analog video input).

DVI (DVI connector)
Change the image input signal source to DVI (digital video input).

EXIT
Exit the OSD dialog box.

Adjusting the screen picture

Press the **Menu button** to display the **PICTURE menu**. Use steps 3 - 4 of Navigating the menu instructions (page 18) to navigate and change the settings.

Brightness
Adjust the brightness of the screen.

Contrast
Adjust the ratio of luminance between black and white, adjusts distinction.

Blacklevel
Adjust the black level of the screen.

Sharpness
Adjust to sharpen or soften the picture.

EXIT
Exit the OSD dialog box.

Adjusting the color

Press the **Menu button** to display the **COLOR menu**. Use steps 3 - 4 of Navigating the menu instructions (page 18) to navigate and change the settings.

Temperature
Enter the **User Menu** (White color adjustment)

Auto Color
The color is set automatically from the external signal (only available when A RGB is used)

EXIT
Exit the OSD dialog box.

Adjusting the color temperature

Highlight the **Temperature** option and press the **Menu button**.

User
User defined screen color temperature (Red, Green and Blue tinge)

Warm
Red tinged screen.

Normal
Green tinged screen.

Cool
Blue tinged screen.

EXIT
Exit the OSD dialog box.

Available when the Analog RGB mode is used (VGA connector)

Adjusting the display settings

Press the **Menu button** to display the **IMAGE CONTROL menu**. Use steps 3 - 4 of Navigating the menu instructions (page 18) to navigate and change the settings.

Auto
Executes an auto adjustment for the width, phase and position of the display (factory settings).

Width
Adjust the horizontal size of the screen by increasing or decreasing the number of picture elements. Only adjust this setting if you have an horizontally unmatched picture after doing an auto adjustment.

Phase
Adjust the phase of the screen. Only adjust when noise or overlapped lines are shown on the screen.

H Position
Moves the screen horizontaly.

V Position
Moves the screen verticaly.

EXIT
Exit the OSD dialog box.

Tool menu

Press the **Menu button** to display the **TOOL menu**. Use steps 3 - 4 of Navigating the menu instructions (page 18) to navigate and change the settings.

OSD Control
Enter the **OSD Control Menu** by pressing the **Menu button**.

Reset
Change all settings to factory set values.

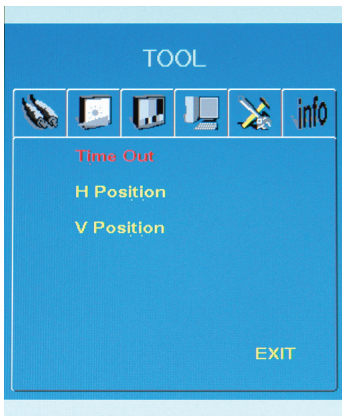
Reset Color
Change the color settings to factory set values.

Reset Position
Change the screen position to factory set values.

Mute
Sets the sound ON and OFF.

Volume
Adjusts the sound volume of the eye tracker speakers.

EXIT
Exit the OSD dialog box.



OSD Control menu

Highlight the **OSD Configuration Menu** and press the **Menu button**.

Time OUT
Adjust the view time of the OSD dialog box.

H Position
Adjust horizontal position of OSD dialog box.

V Position
Adjust vertical position of OSD dialog box.

Information

Press the **Menu button** to display the **INFORM menu**. Use steps 3 - 4 of Navigating the menu instructions (page 18) to navigate and change the settings.

Inform
Displays image input information.

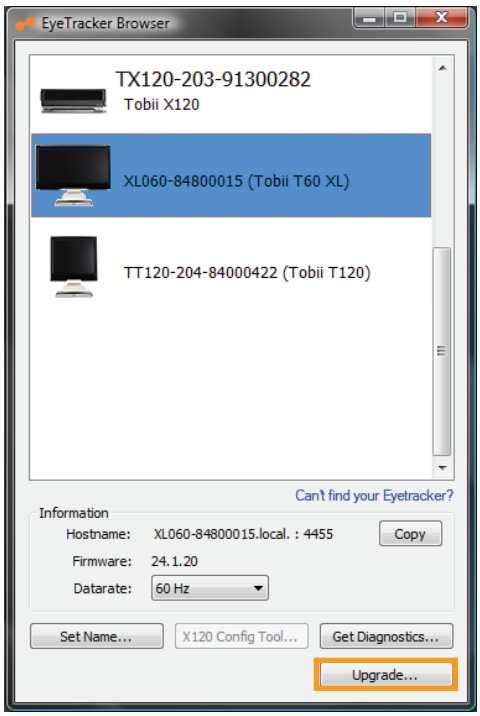
Version
Displays information on the screen's controler firmware.

Appendix I: Eye Tracker Upgrade

Eye tracker software upgrade

Follow the instructions below to upgrade the eye tracker software.

1. Open the Tobii EyeTracker Browser, found under **Start > All Programs > Tobii.**
2. In the Tobii EyeTracker Browser mark the eye tracker that is to be upgraded.
3. Click the **Upgrade button**.
4. Browse to the folder where the upgrade files are saved.
5. Select the upgrade file with the file extension **.tobiipkg** and click **OK**.
6. A message stating that the upgrade is finished should appear. Click **OK** to close.



Appendix II: Troubleshooting Guide

The Tobii T Series Eye Trackers use a network connection to communicate with the computer. This guide helps you to troubleshoot the most common connection issues with your Tobii Eye Tracker.

Note: This guide assumes that the tracker in question has firmware 1.2.x or higher installed, and that the latest Tobii Studio or Tobii Eye Tracking Tools is installed on the computer.

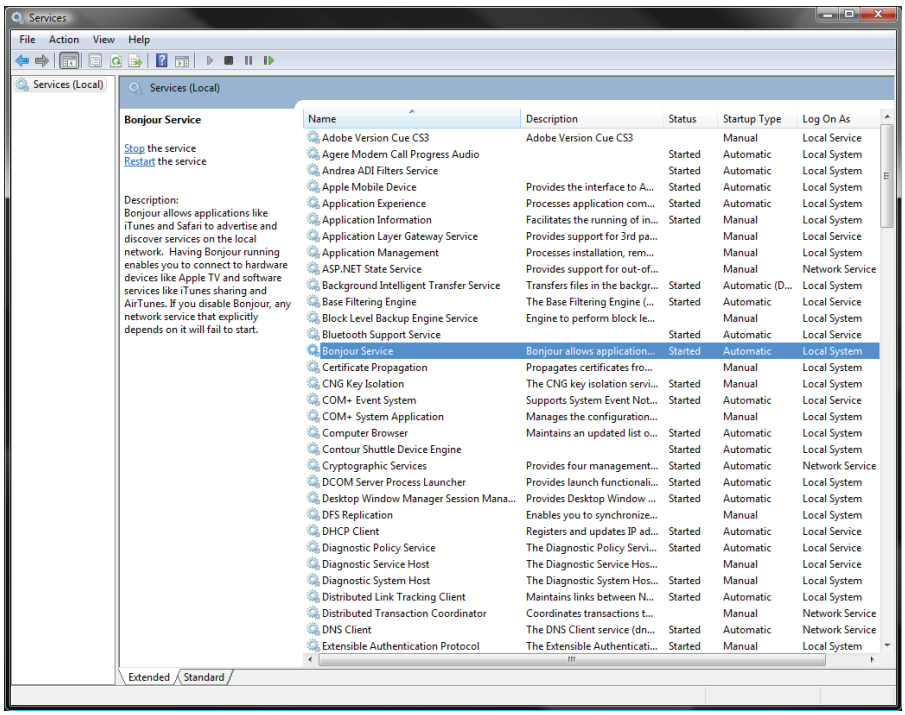
Problems with the Apple Bonjour Service

The Apple Bonjour service is used by the Tobii Eyetracker Browser and Tobii Studio to identify the eye trackers that are connected to the same network as the computer. The service is installed automatically with Tobii Studio and the Tobii Eye Tracking Tools.

1. **The Apple Bonjour Service is not installed on the computer.**

   Check if the service is installed on the computer:

   Open the **Windows Control Panel** (**Classic View**) > **Administrative Tools** > **Services**.


Services
File Action View Help
Services (Local)
Bonjour Service
Stop the service
Restart the service
Description:
Bonjour allows applications like iTunes and Safari to advertise and discover services on the local network. Having Bonjour running enables you to connect to hardware devices like Apple TV and software services like iTunes sharing and AirTunes. If you disable Bonjour, any network service that explicitly depends on it will fail to start.
Name
Description
Status
Startup Type
Log On As
Adobe Version Cue CS3 — Adobe Version Cue CS3 — Manual — Local Service
Agere Modem Call Progress Audio — Started — Automatic — Local System
Andrea ADI Filters Service — Started — Automatic — Local System
Apple Mobile Device — Provides the interface to A... — Started — Automatic — Local System
Application Experience — Processes application com... — Started — Automatic — Local System
Application Information — Facilitates the running of in... — Started — Manual — Local System
Application Layer Gateway Service — Provides support for 3rd pa... — Manual — Local Service
Application Management — Processes installation, rem... — Manual — Local System
ASP.NET State Service — Provides support for out-of... — Manual — Network Service
Background Intelligent Transfer Service — Transfers files in the backgr... — Started — Automatic (D... — Local System
Base Filtering Engine — The Base Filtering Engine (... — Started — Automatic — Local Service
Block Level Backup Engine Service — Engine to perform block le... — Manual — Local System
Bluetooth Support Service — Started — Automatic — Local Service
Bonjour Service — Bonjour allows application... — Started — Automatic — Local System
Certificate Propagation — Propagates certificates fro... — Manual — Local System
CNG Key Isolation — The CNG key isolation servi... — Started — Manual — Local System
COM+ Event System — Supports System Event Not... — Started — Automatic — Local Service
COM+ System Application — Manages the configuration... — Manual — Local System
Computer Browser — Maintains an updated list o... — Started — Automatic — Local System
Contour Shuttle Device Engine — Started — Automatic — Local System
Cryptographic Services — Provides four management... — Started — Automatic — Network Service
DCOM Server Process Launcher — Provides launch functionali... — Started — Automatic — Local System
Desktop Window Manager Session Mana... — Provides Desktop Window ... — Started — Automatic — Local System
DFS Replication — Enables you to synchronize... — Manual — Local System
DHCP Client — Registers and updates IP ad... — Started — Automatic — Local Service
Diagnostic Policy Service — The Diagnostic Policy Servi... — Started — Automatic — Local Service
Diagnostic Service Host — The Diagnostic Service Hos... — Manual — Local Service
Diagnostic System Host — The Diagnostic System Hos... — Started — Manual — Local System
Distributed Link Tracking Client — Maintains links between N... — Started — Automatic — Local System
Distributed Transaction Coordinator — Coordinates transactions t... — Manual — Network Service
DNS Client — The DNS Client service (dn... — Started — Automatic — Network Service
Extensible Authentication Protocol — The Extensible Authenticati... — Started — Manual — Local System
Extended
Standard

   If the Apple Bonjour Service is not listed, then it will have to be installed on the computer. First check that either Tobii Studio or the Tobii Eye Tracking Tools are installed on the computer, open the **All Programs** folder in your Windows **Start** menu:

   1. If a folder named **Tobii** containing the **Tobii Eyetracker Browser** is present in the **All Programs** folder, then at least one of the two is installed. If that is the case, download and install the latest version of the Apple Bonjour Service from: http://www.apple.com/support/downloads/bonjourforwindows.html

   2. If the **Tobii** folder is missing from the **All Programs** folder, then re-install Tobii Studio or the Tobii Eyetracker Browser on the computer.

2. **The Apple Bonjour Service is installed but not started.**

   Open the **Windows Control Panel** (**Classic View**) > **Administrative Tools** > **Services**.

   Check in the **Services** list if the **Apple Bonjour Service's Status** is set to **Started**. If the **Status** is empty then right click on it and select **Start**. Restart any Tobii applications and connect again.

3. **The Apple Bonjour Service cannot be started.**

   Most likely the service is blocked by an anti-virus software or Group Policy. Check any Group Policies and anti-virus software installed (not only running) on the computer. If you do not know how to do this, please contact your IT administrator as the procedure differs between security applications.

4. **The Apple Bonjour Service is up and running but there is still no connection.**

   Check that the port Apple Bonjour Service uses to scan the network is not blocked by any firewall. It uses UDP port 5353. If you need help in doing this, please contact your IT administrator as the procedure for doing this differs between security applications.

5. **If none of the above works.**

   If the computer is not connected to the Internet and Skype is running, Skype will flood all network connections in attempts to connect to the Skype servers. This can cause problems with the eye tracker connection. Turn off Skype.

6. **The eye tracker takes a long time to start tracking.**

   If the eye tracker shows a delay of 10-30 seconds when showing the track status, starting a calibration or starting a recording, try to upgrade the Apple Bonjour Service to its most recent version (see point 1). Using an outdated version of the Apple Bonjour Services may cause slow connection problems.

Problems with the peer-to-peer network configuration

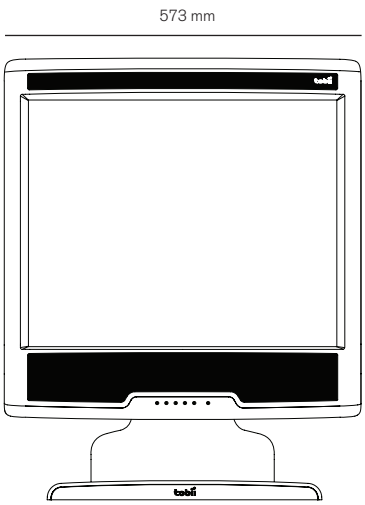
When the eye tracker is connected directly to the test computer it uses a network connection with a DHCP server.

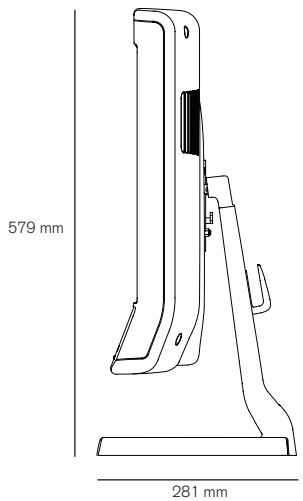
Check if the network card is set to obtain an IP address automatically (read pages 9-11 of this manual).

Appendix III
Technical Specifications

Tobii T Series Eye Trackers

Mechanical measurements





Models	T60/T120*	T120*
Data rate	60 Hz	120Hz
Accuracy	typical 0.5 degrees	typical 0.5 degrees
Drift	typical 0.1 degrees	typical 0.1 degrees
Spatial resolution	typical 0.2 degrees	typical 0.3 degrees
Head movement error	typical 0.2 degrees	typical 0.2 degrees
Head movement box (width x hight)	44 x 22 cm at 70 cm	30 x 22 cm at 70 cm
Tracking distance	50-80 cm	50-80 cm
Max gaze angles	35 degrees	35 degrees
Top head-motion speed	25 cm/second	25 cm/second
Latency	maximum 33 ms	maximum 33 ms
Blink tracking recovery	maximum 17 ms	maximum 8 ms
Time to tracking recovery	typical 300 ms	typical 300 ms
Weight (excluding case)	~ 9 kg / 19.8 lbs	
Eye tracking technique	both bright and dark pupil tracking	
Eye tracking server	Embedded	
Screen size	17” TFT	
Screen resolution (Max)	1280 x 1024 pixels)	
Display colors	16.7 M (true 8-bit)	
Vertical sync frequency	56-75 Hz	
Horizontal sync frequency	30-60 kHz	
TFT response time	4 ms	
User camera	Built in, frame rate 640 x 480@ 30 fps	
Speakers	Built in, 2 x 4W power	
Connectors	LAN, VGA, DVI-D, Power, User Camera and Audio	

Average values over the screen measured at a distance of 63 cm in a controlled office environment.

* The Tobii T120 Eye Tracker can be run in 60 or 120 Hz mode.

Glossary - technical specifications

Data rate	Number of sampled gaze points per second. The Tobii T60 XL has a stable data-rate of 60 Hz; that is 60 gaze data points per second are collected for each eye.
Accuracy	The typical difference between the Measured Gaze Direction and the Actual Gaze Direction at different parts of the screen for a person positioned at the centre of the eye tracking box. This does not include drift effects and compensation errors from larger head movements. The accuracy of the Tobii eye trackers varies depending on external conditions such as lighting, quality of the calibrations, and individual eye characteristics.
Drift	Change in accuracy due to change in lighting. The specified value relates to complete inversion of screen color, e.g from black to white without recalibration in between.
Spatial resolution	The term “spatial resolution”, or “noise”, denotes the frame-to-frame variation of the measured gaze point.
Head movement error	Decrease of accuracy at the edges of the eye-tracking box as compared to the centre where the calibration was done. This includes head translations sideways as well as movement back and forth and up and down. The value is an average of the two types of translations.
Head movement box	Measures the box (height × width in cm) where at least one of the eyes is within the field of view of the eye tracker (the present value was measured at 70 cm distance from the sensor).
Tracking distance	The distances to the sensor within which the eye tracker is able to detect at least one of the eyes.
Max gaze angles	Maximum gaze angle that the eye tracker can detect at least one pupil. The angle is calculated from the centre of the sensor.
Top head-motion speed	The maximum speed that a user can move the head at which the eye tracker is able to still find at least one pupil.
Latency	Is calculated from the time when an image was shot to when a valid gaze point is delivered to an eye tracking application there is a certain delay. This delay is caused both by sensor hardware and by the computation of the eye tracking software algorithms. Since the timestamp is set at exposure, such delay does not affect the accuracy of the timestamp.
Time to tracking recovery	An eye tracker working in a natural user environment often loses track of the eyes of the user, for example, when the user is blinking, looking down to type, or when the user completely turns away from the tracker. This measure represents the typical time from tracking failure to when the eye tracker finds the eyes again.
Eye tracking technique	The Tobii Eye Trackers use two different techniques to determine eye position: 1. Bright pupil eye tracking, where an illuminator is placed close to the optical axis of the imaging device, and causes the pupil to appear lit up (this is the same phenomenon that causes red eyes in photos). And 2. Dark pupil eye tracking where the illuminator is placed away from the optical axis causing the pupil to appear black.
Eye tracking server	Gaze data calculations are performed by firmware embedded in the eye tracker. Different applications can be connected as clients to the eye tracker system over a LAN connector to gather eye gaze data and other data in real-time and to perform calibrations and other actions.

Eye tracker data output

Different applications can be connected as clients to the eye tracker system over TCP/IP (LAN connector) to gather eye gaze data in real-time and to perform calibrations (and other actions). Examples of applications that can be used together with the eye tracker include the Tobii Studio™ analysis software, third party analysis products such as E-Prime, or your own custom written software for analysis, gaze-contingent applications, or eye control applications. For more information on how to create your own applications, please refer to the Tobii Software Development Kit (SDK) product description.

Below you can find a list of all data that can be accessed through the output of the eye tracker. In Tobii Studio™ analysis software this data can be accessed through a Raw data text export function, and easily imported into a spreadsheet for further analysis.

Timestamp	Timestamp in milliseconds for when the gaze data was collected
Gaze PointXLeft	Horizontal screen position of the gaze point for the left eye
GazePointYLeft	Vertical screen position of the gaze point for the left eye
CamXLeft	Horizontal location of the left pupil in the camera image (0 is left edge, 1 is right edge)
CamYLeft	Vertical location of the left pupil in the camera image (0 is top, 1 is bottom)
DistanceLeft	Distance from the eye tracker to the left eye. The distance is given in mm on a straight axis right out from the eye tracker plane
PupilLeft	Size of the pupil (left eye) in mm. The distance and pupil size measures are calculated to be as close to real values as possible. However, individual differences in the eyes of subjects and the strength of glasses/contact lenses will cause errors in these values. The measures still reflect changes in head position and pupil size accurately.
ValidityLeft	Validity of the gaze data. The validity is 0 if the eye is found and the tracking quality good. If the eye cannot be found by the eye tracker the validity code will be 4. Read more under the Validity codes section further down
Gaze PointXRight	The horizontal screen position of the gaze point for the right eye
GazePointYRight	Vertical screen position of the gaze point for the right eye
CamXRight	Horizontal location of the right pupil in the camera image (0 is left edge, 1 is right edge)
CamYRight	Vertical location of the right pupil in the camera image (0 is top, 1 is bottom)
DistanceRight	Distance from the eye tracker to the right eye. The distance is given in mm on a straight axis right out from the eye tracker plane
PupilRight	Size of the pupil (right eye) in mm. The distance and pupil size measures are calculated to be as close to real values as possible. However, individual differences in the eyes of subjects and the strength of glasses/contact lenses will cause errors in these values. However, the measures still reflect changes in head position and pupil size accurately
ValidityRight	Validity of the gaze data. The validity is 0 if the eye is found and the tracking quality good. If the eye cannot be found by the eye tracker the validity code will be 4. The value is for the right eye. Read more under the Validity codes section further down

Additional data available in the Tobii Studio Raw Data Export

DateTimeStamp	Timestamp recalculated using the computer date time, shown in hours, minutes, seconds and milliseconds (hh:mm:ss:ms)
DateTimeStampStartOffset	Timestamp converted into hh:mm:ss format. The start time for the recording is also shown in the Replay and Visualization views in Tobii Studio if the option Show Date is selected in the Recordings field.
Number	Timestamps in numbered order
FixationIndex	Indexes for the fixation points (values correspond to the order of the fixation).
GazePointX	Gaze PointX can be the horizontal screen position for either eye or the average for both eyes. The value to show here is specified in Tobii Studio. This value is also used for the fixation definition.
GazePointY	GazePointY can be the horizontal screen position for either eye or the average for both eyes. The value to show here is specified in Tobii Studio. This value is also used for the fixation definition.
Event	Events, automatic and logged, will show up under Events. The automatic events are start and end events for the different media, mouse clicks and key presses. The automatic events are listed in the event table under Event Key and Data. The logged events are the manually logged events entered either in the replay view or from the remote logger
EventKey	Unique event key is shown for different key presses.
Data1	Data field for the event. The contents of this field vary depending on what type of event this is.
Data2	Data field for the event. The contents of this field vary depending on what type of event this is.
Descriptor	Description of the event. The contents vary depending on what type of event this is.
StimuliName	The file name of the media given in the setup in Tobii Studio
MediaWidth	Media size in pixels
MediaHeight	Media size in pixels
MediaPosX	Distance from the left side of the screen to the media on the screen given in pixels
MediaPosY	Distance from the top of the screen to the media on the screen given in pixels
MappedFixationPointX	X coordinate for the fixation point mapped to the media coordinate system, where the origin for the coordinate system is the top left corner of the image/media
MappedFixationPointY	Y coordinate for the fixation point mapped to the media coordinate system, where the origin for the coordinate system is the top left corner of the image/media
FixationDuration	Fixation duration. The time in milliseconds that a fixation lasts
AoiIds	ID number for the AOI, usually a counter starting at zero for the first AOI
AoiNames	Name of the AOI or AOIs if fixations on multiple AOIs are to be written on the same row
WebGroupImage	Filename of the image file that is used to visualize the web group
MappedGazeDataPointX	X coordinate for the raw gaze data point mapped to the media coordinate system where the origin for the coordinate system is the top left corner of the image/media
MappedGazeDataPointY	Y coordinate for the raw gaze data point mapped to the media coordinate system where the origin for the coordinate system is the top left corner of the image/media
MicroSecondTimestamp	Timestamp for this export row in microseconds
ValidityCodes	Validity code for each data point. This code is is based on whether the system is able to identify correctly both eyes. It is recommended that the validity codes should always be used for data filtering, to remove data points that are obviously incorrect.

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